



---

## **AFSO21 / D&SWS / Tech Development:**

# **Air Force Initiative – High Confidence Technology Transition Planning Through the Use of Stage-Gates (TD-13)**

**11 Sep 08**

**Dr. Claudia Kropas-Hughes, HQ AFMC/A5S**

**Ms. Lynda Rutledge, 708 ARSG/CL**

**Mr. George Sarmiento, PMP, HQ AFMC/A5S**

Report Documentation Page			Form Approved OMB No. 0704-0188		
Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.					
1. REPORT DATE <b>11 SEP 2008</b>		2. REPORT TYPE		3. DATES COVERED <b>00-00-2008 to 00-00-2008</b>	
4. TITLE AND SUBTITLE <b>AFSO21 / D&amp;SWS / Tech Development: Air Force Initiative - High Confidence Technology Transition Planning Through the Use of Stage-Gates (TD-13)</b>				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) <b>HQ AFMC/A5S,4375 Chidlaw Rd,Wright Patterson AFB,OH,45433</b>				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT <b>Approved for public release; distribution unlimited</b>					
13. SUPPLEMENTARY NOTES <b>See also ADM002183. Presented at the Technology Maturity Conference held in Virginia Beach, Virginia on 9-12 September 2008.</b>					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT <b>Same as Report (SAR)</b>	18. NUMBER OF PAGES <b>31</b>	19a. NAME OF RESPONSIBLE PERSON
a. REPORT <b>unclassified</b>	b. ABSTRACT <b>unclassified</b>	c. THIS PAGE <b>unclassified</b>			



# Agenda

---

- ➡ ■ **Introduction**
- **Outputs of Initiative**
  - **Users Guide**
  - **Automated Tool – Turbo Technology Program Management Model (TurboTPMM)**
- **Upcoming OSD-level Policy Changes**
- **Schedule**
- **Change Management issues – solicit ideas**
- **Summary / Way Ahead**



# Introduction

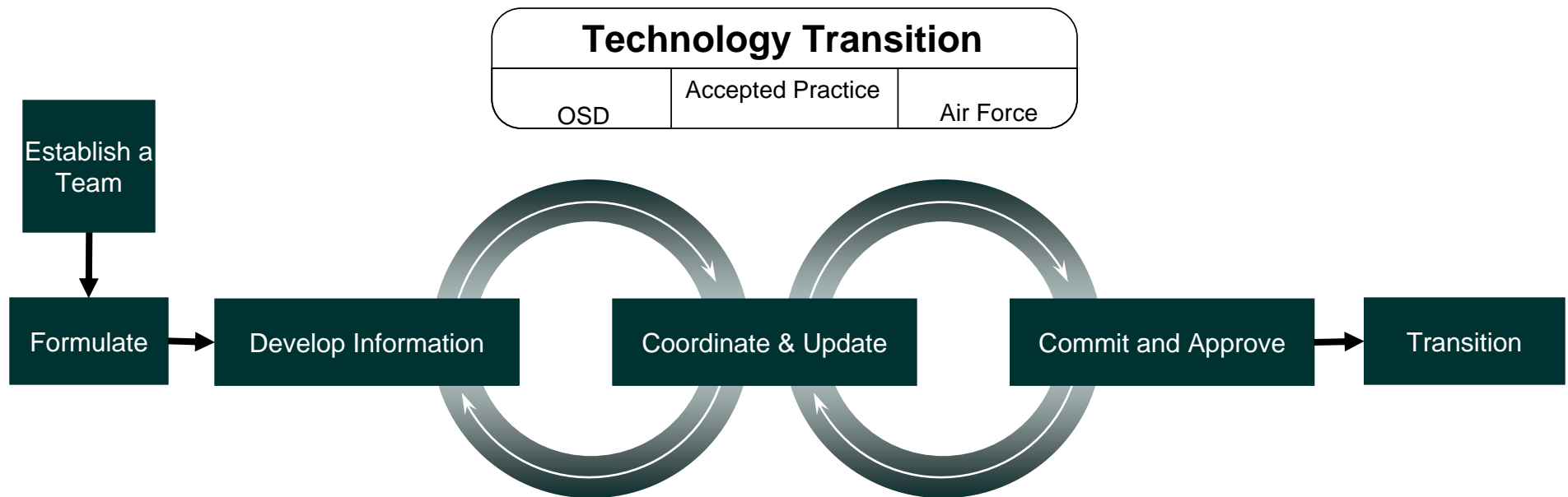
---

- **Initiative focus on Technology Transition**
  - **Early and complete life-cycle transition planning**
  - **Create a common understanding of the technology transition processes to be applied at all life cycle stages**
- **Initiative Goal – Improve transition success**
  - **Improved planning will lead to increased probability and speed of the transition and increase confidence of acquisition programs.**
  - **Key aspect of this process will be making sure the right people are involved earlier in the process for increased collaboration between researcher, acquisition and stakeholders**



# Introduction

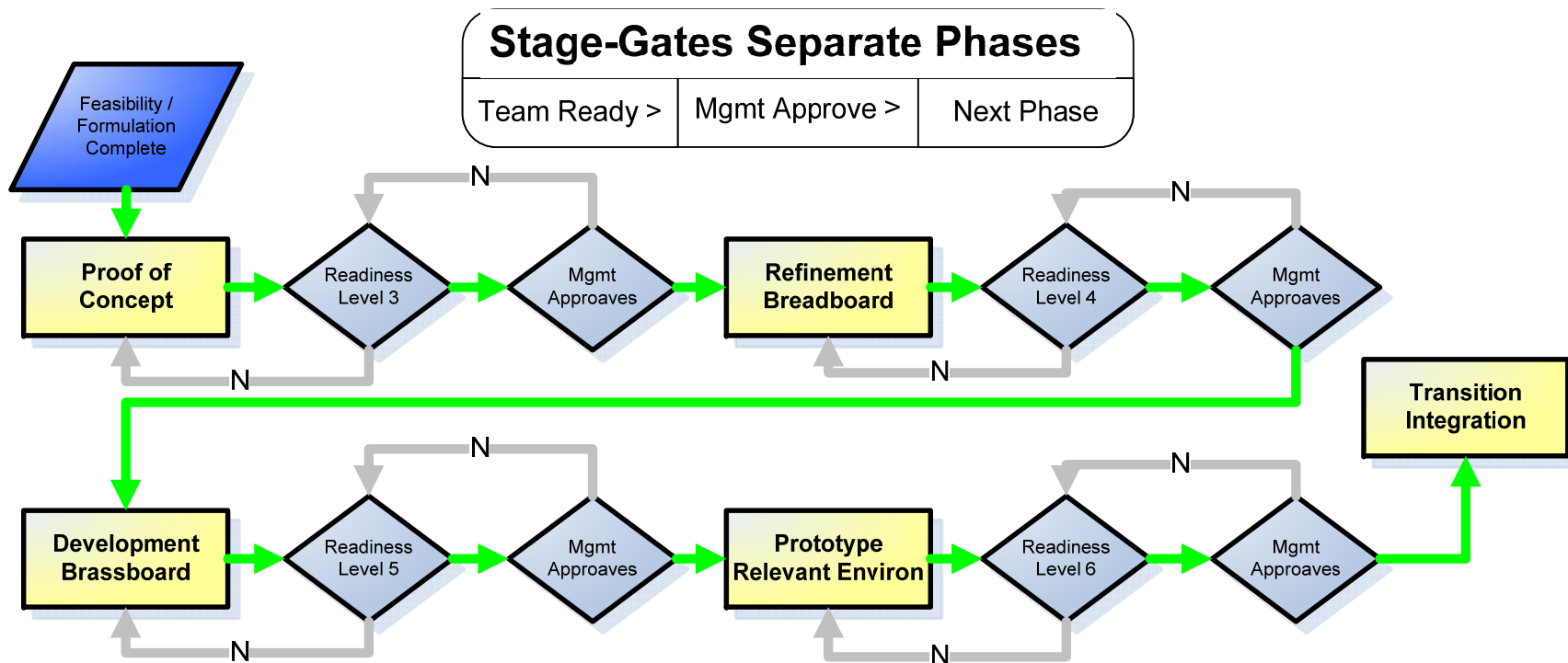
- **Current Best Practice: Transition process Iterative w/in technology readiness phases:**
  - **Establish a team, formulate a strategy**
    - **Iterate: develop/gather information, document and coordinate agreement, and commitment / approval**





# Introduction

- **NEW:** TD-1-13 provides a formalized process, the mechanism (stage-gate criteria) and detailed activities and milestones necessary to transition from phase to phase





# Introduction

---

- **What is “New” about this initiative:**
  - **Develop a stage-gate process (TRL based / driven)**
    - A decision point on whether a project is proceeding as planned and a go, no-go or hold decision is made
    - Phases are: Feasibility, Formulation, **Proof of Concept, Breadboard (Lab Env), Brassboard (Relevant Env) and Prototype (Relevant Env) (TRL3-6)**
  - **Entry/Exit Criteria (tech & programmatic) shall be used prior to advancing to the next stage in the transition process. Highlights change in team roles and responsibilities over time.**
    - Spiral 1: existing readiness levels (TRLs and MRLs), cost, schedule, performance, early “-ilities” considerations;
    - Spiral 2: additional “-ilities” identified in TD-1-12



# Introduction

---

## ■ Membership

- Consists of representatives from all Centers and relevant members of Air Staff
- Chartered by Seniors SAF/AQ, AFRL/CC, AFMC/CC
  - Broad experience base for this approach
- Culture Change





# Agenda

---

- Introduction
- ➔ ■ **Outputs of Initiative**
  - Users Guide
  - Automated Tool – Turbo Technology Program Management Model (TurboTPMM)
- Upcoming OSD-level Policy Changes
- Schedule
- Change Management issues – solicit ideas
- Summary / Way Ahead



# Output – Users Guide

---

- **Users Guide – for developing the strategy for technology development and transition**
  - **How to build Technology Development and Transition Strategy (TDTS) and required documentation**
    - **How to execute the stage-gating**
    - **How to build the entrance/exit criteria**
- **Automated Tool to facilitate the implementation of the User Guide (to be discussed under Tools)**
- **Air Force Instruction to codify process**



# Agenda

---

- Introduction
- Outputs of Initiative
- ➡ ■ Users Guide
  - Automated Tool – Turbo Technology Program Management Model (TurboTPMM)
- Upcoming OSD-level Policy Changes
- Schedule
- Change Management issues – solicit ideas
- Summary / Way Ahead



# User Guide

---

- **Easy to read and understand documentation on the Technology Transition Process Using Stage-Gates**
  - **Part 1 – Description of Stage-Gate Process for Technology Development**
  - **Part 2 – Explains “How to” Navigate the Process**
- **Power of the Process is in Teamwork**
  - **Having the right people on the team at the right time – Chaired by Program Manager and Co-Chaired by Technology Manager**
- **Process will apply to all key advanced programs**
  - **Top 50% of all AFRL 6.3 programs**
  - **High Visibility Programs**
  - **Industry-developed technology programs**



# Today's Process

## ■ Stovepipe Document Generation: TTP : TDS : LCMP

Owner:

AFRL Technology Developer, pre MS-A

### Tech Transition Plan (TTP)

- Signature Page
- Development Strategy
  - Participants
  - Tech Availability
  - Program Objectives
  - Target Acq Programs
  - Approach
  - Products / Payoff
  - Risk Analysis
  - Exit Criteria / RL
- Acquisition Strategy
  - Identify Stakeholders
  - Capability / Rqmts
  - Bus/Contract/Fin
  - Logistics / Mfg
  - Intelligence
- Transition Strategy
  - Integration Plan

Owner:

Acquisition PM @ MS-A

### Tech Development Strategy (TDS)

(Public Law 107-314, Sec 803)

- Acquisition Approach
  - Supporting Rationale
- R&D Strategy
  - Performance Goals
  - CSP and Spirals
- Describe Tech Demo
  - CSP and Exit Criteria
- Develop Test Plan
  - Goal / Exit Criteria
  - Ensure Maturity Level

Note: Multiple Spirals may be necessary before user & developer agree the solution is: Affordable, Military Useful and based on mature technology

Owner:

Acquisition PM @ MS-B

### LCMP

- Exec Summary
- Mission/Rqmts
- Program Summary
- Program Mgmt
- Business Strategy
- Risk Mgmt
- Cost and Performance Mgmt
- Test Approach
- Product Support Concept

Note: TDS required at MS-A, but often Milestone not held



# To Be Process

## ■ Tech Development & Transition Strategy (TDTS)

- Replaces the TTP
- TDS is subset of TDTS required at Milestone A
- As program progresses – TDTS “Morphs” to LCMP

Owner: Acquisition PM

### Tech Development & Transition Strategy (TDTS)

- **Replaces** TTP, *but a gated approach defining depth required at each phase.*
- Integrated Strategy (Technology Development and Acquisition)
- Example: As team approaches:
  - MS-A (TRL-4) – Gates/checklist ensures TDS is complete
  - MS-B (TRL-6) – Gates/checklist ensures LCMP is complete

Subset

### Tech Development Strategy (TDS)

(Public Law 107-314, Sec 803)

- Acquisition Approach
  - Supporting Rationale
- R&D Strategy
  - Performance Goals
  - CSP and Spirals
- Describe Tech Demo
  - CSP and Exit Criteria
- Develop Test Plan
  - Goal / Exit Criteria
- Ensure Maturity Level

Becomes

### LCMP

- Exec Summary
- Mission/Rqmts
- Program Summary
- Program Mgmt
- Business Strategy
- Risk Mgmt
- Cost and Performance Mgmt
- Test Approach
- Product Support Concept



# Agenda

---

- Introduction
- Outputs of Initiative
  - Users Guide
  - ➔ ■ Automated Tool – Turbo Technology Program Management Model (TurboTPMM)
- Upcoming OSD-level Policy Changes
- Schedule
- Change Management issues – solicit ideas
- Summary / Way Ahead



# Automated Tool - TurboTPMM

---

- **TurboTPMM Tool – A database that will be the repository of the stage-gates (i.e. checklists) and the documentation required for each TDTS**
  - **Automates Stage-gate process**
  - **Easy to use, walks user through the process**
  - **Turbo-Tax© like software that asks the right questions**
  - **Ensures application of Systems Engineering principles**
  - **Contract to Dynetics through Army SMDC**
  
- **DAU to join in on Collaboration with TurboTPMM**





# TurboTPMM – Scope and Requirements

---

- **Ease of Use**
  - Develop a Graphical User Interface
  - Prove feasibility of automating the process
- **Portfolio Management**
  - Develop capability to output Readiness data
- **Reporting**
  - Develop a Reporting Capability
- **Common Language**
  - Adapt Army to USAF lexicon, templates, events



# Stage-Gate Example

---

## **STAGE GATE #3**

**DESCRIPTION:** This is the first stage-gate in the Technology Development and Transition Strategy process.

### **EXIT CRITERIA:**

1. TRL == 3 MRL == 3
2. The Technology Concept has been proven sufficient to meet the User Need in a Laboratory environment and a Proof of Concept is documented
3. The Technology Development and Transition Strategy (TDTS) is drafted.
4. The Technology Transition Agreement (TTA) documented at “Interest” is drafted.

**5. ENTRANCE CRITERIA FOR NEXT PHASE:** A Breadboard Laboratory Validation Plan has been developed whose purpose, objectives and scope are adequately described

***Tool focuses the team on the tasks necessary to meet these exit criteria.  
Provides a repository for the information created during technology development.***



# Agenda

---

- Introduction
- Outputs of Initiative
  - Users Guide
  - Automated Tool – Turbo Technology Program Management Model (TurboTPMM)
- ➡ ■ Upcoming OSD-level Policy Changes
- Schedule
- Change Management issues – solicit ideas
- Summary / Way Ahead



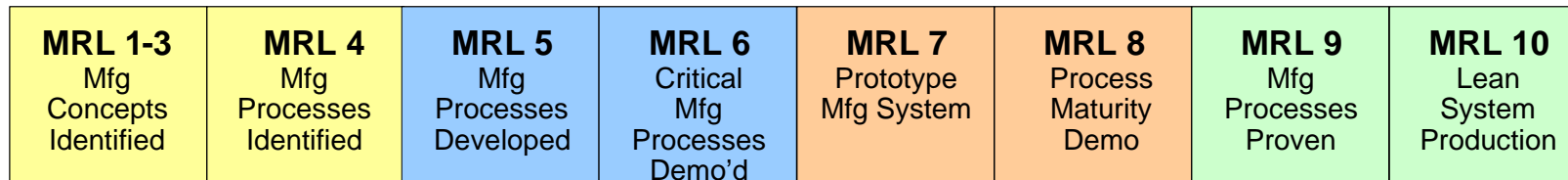
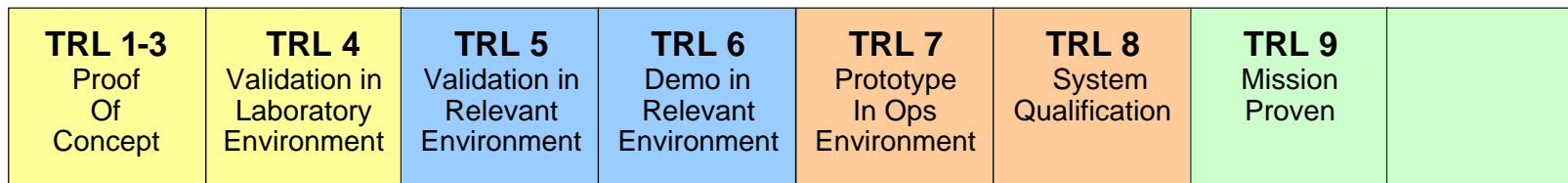
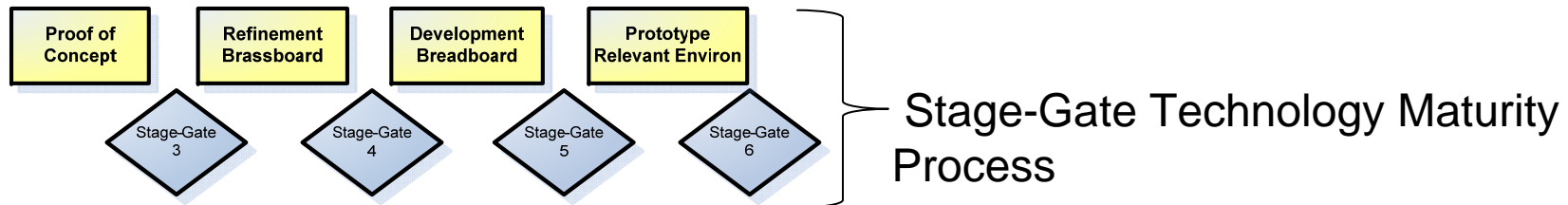
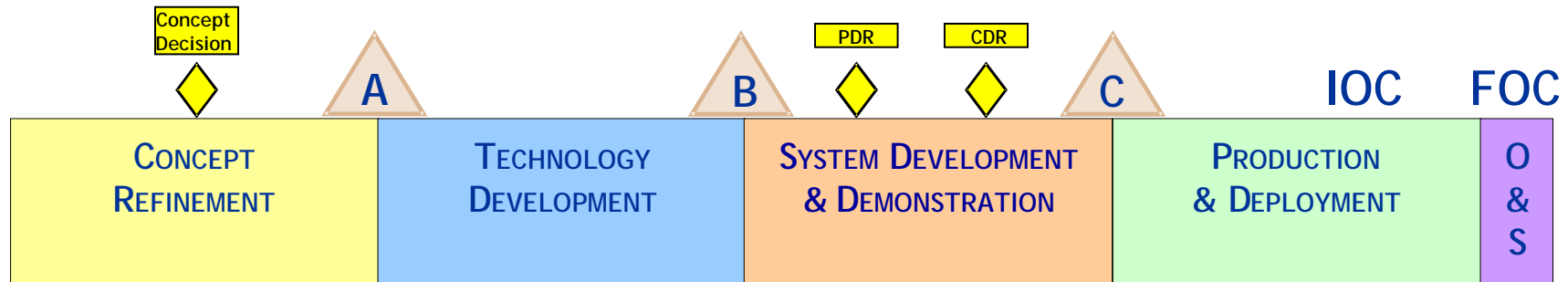
# Upcoming OSD Changes and Other Policy Changes

---

- **Upcoming Changes:**
  - **DoD 5000 Re-write – PDR before Milestone B**
  - **AF Initiative: Addition of Sufficiency Reviews**
- **If team follows stage-gate process, they will always be able to answer where they are today and how long to agreed to transition point**
  - **Supports MS-briefings and PDR shift to Tech Development**
  - **Provides information for Sufficiency Reviews**
  - **Make Milestone B TRA easier - less obtrusive**

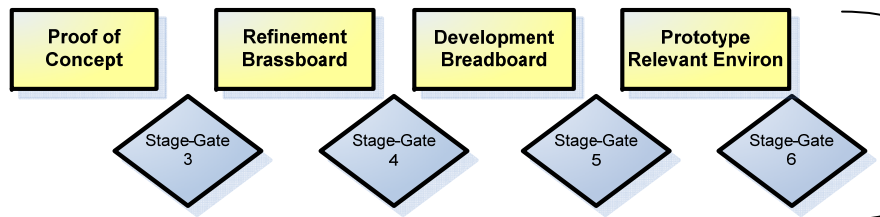
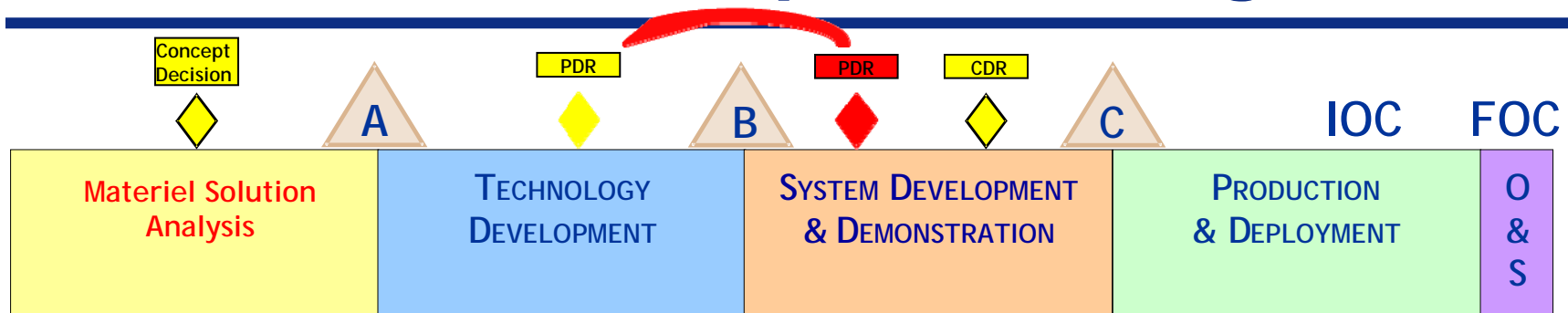


# Stage-Gates Process Alignment with Acquisition





# Stage-Gates Process – with OSD Proposed Changes



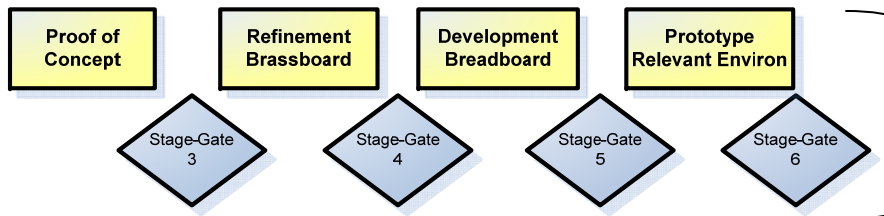
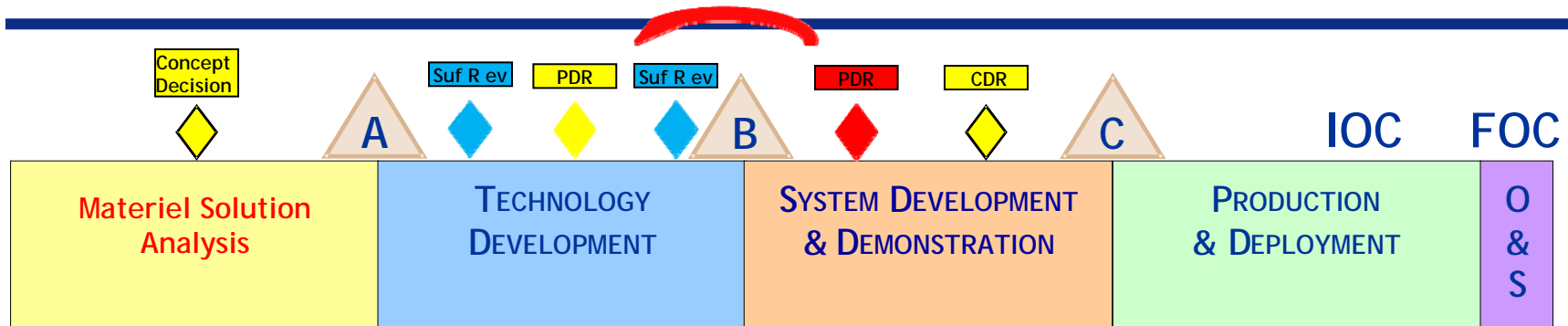
- Stage-Gate Process does not change
- Follow process to always know maturity
- Guide to be shared with Industry (RFP)

<b>TRL 1-3</b> Proof Of Concept	<b>TRL 4</b> Validation in Laboratory Environment	<b>TRL 5</b> Validation in Relevant Environment	<b>TRL 6</b> Demo in Relevant Environment	<b>TRL 7</b> Prototype In Ops Environment	<b>TRL 8</b> System Qualification	<b>TRL 9</b> Mission Proven	
------------------------------------	--	--	--	--	--------------------------------------	--------------------------------	--

<b>MRL 1-3</b> Mfg Concepts Identified	<b>MRL 4</b> Mfg Processes Identified	<b>MRL 5</b> Mfg Processes Developed	<b>MRL 6</b> Critical Mfg Processes Demo'd	<b>MRL 7</b> Prototype Mfg System	<b>MRL 8</b> Process Maturity Demo	<b>MRL 9</b> Mfg Processes Proven	<b>MRL 10</b> Lean System Production
---	--	---	---	--------------------------------------	---------------------------------------	--------------------------------------	---



# Stage-Gates Process – with Sufficiency Reviews (LCM-1-7)



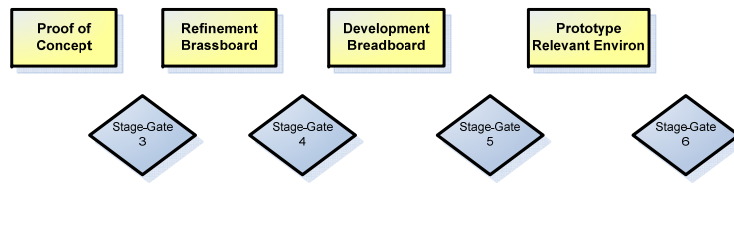
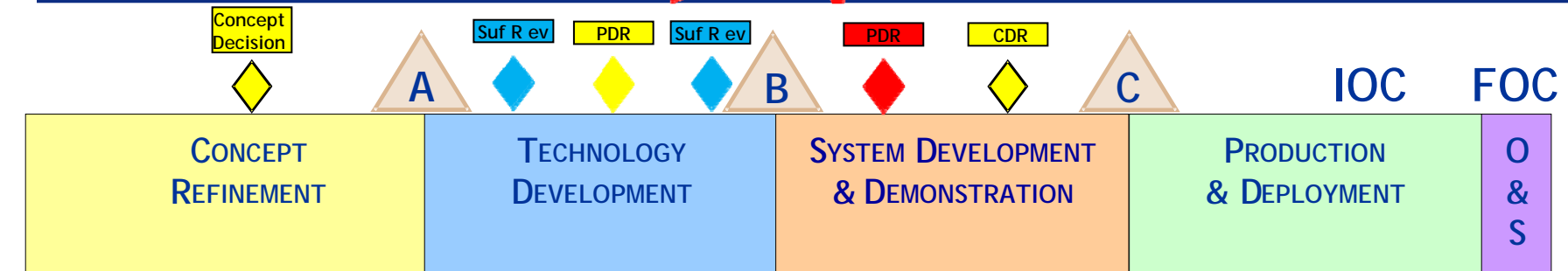
- Stage-Gate Process does not change
- Follow process to always know maturity
- Guide to be shared with Industry (RFP)

<b>TRL 1-3</b> Proof Of Concept	<b>TRL 4</b> Validation in Laboratory Environment	<b>TRL 5</b> Validation in Relevant Environment	<b>TRL 6</b> Demo in Relevant Environment	<b>TRL 7</b> Prototype In Ops Environment	<b>TRL 8</b> System Qualification	<b>TRL 9</b> Mission Proven	
------------------------------------	--	--	--	--	--------------------------------------	--------------------------------	--

<b>MRL 1-3</b> Mfg Concepts Identified	<b>MRL 4</b> Mfg Processes Identified	<b>MRL 5</b> Mfg Processes Developed	<b>MRL 6</b> Critical Mfg Processes Demo'd	<b>MRL 7</b> Prototype Mfg System	<b>MRL 8</b> Process Maturity Demo	<b>MRL 9</b> Mfg Processes Proven	<b>MRL 10</b> Lean System Production
---	--	---	---	--------------------------------------	---------------------------------------	--------------------------------------	---



# Stage-Gates Process – If TRL Requirements Change



- Stage-Gate Process does not change
- Follow process to always know maturity
- Acq criteria (database) may change

TRL 1-3	TRL 4 Validation in Laboratory Environment	TRL 5 Validation in Relevant Environment	TRL 6 Demo in Relevant Environment	TRL 7 Prototype In Ops Environment	TRL 8 System Qualification	TRL 9 Mission Proven	
---------	---	---	---------------------------------------	---------------------------------------	-------------------------------	-------------------------	--

MRL 1-3	MRL 4 Mfg Processes Identified	MRL 5 Mfg Processes Developed	MRL 6 Critical Mfg Processes Demo'd	MRL 7 Prototype Mfg System	MRL 8 Process Maturity Demo	MRL 9 Mfg Processes Proven	MRL 10 Lean System Production
---------	-----------------------------------	----------------------------------	--	-------------------------------	--------------------------------	-------------------------------	----------------------------------







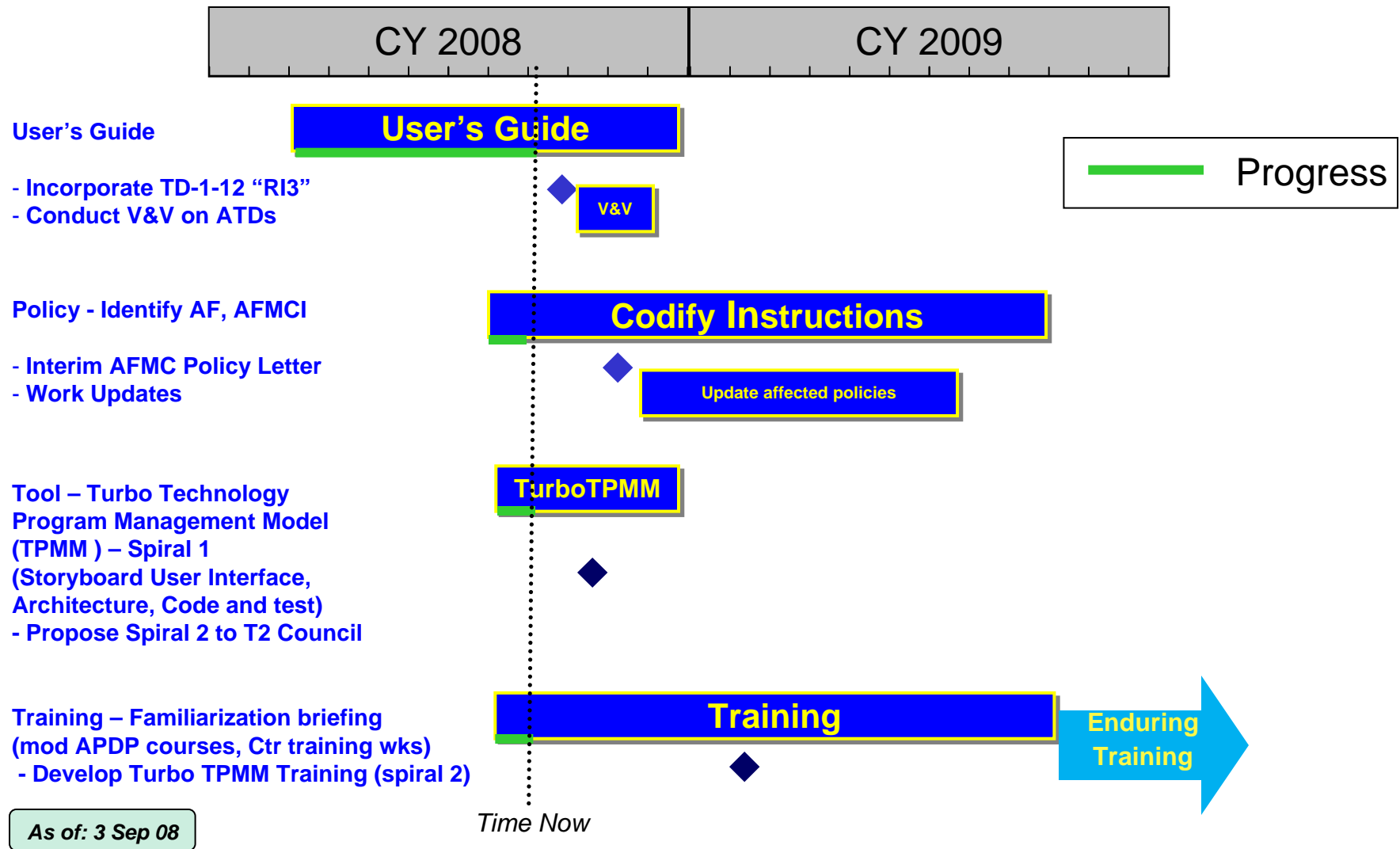
# Agenda

---

- Introduction
- Outputs of Initiative
  - Users Guide
  - Automated Tool – Turbo Technology Program Management Model (TurboTPMM)
- Upcoming OSD-level Policy Changes
- ➡ ■ Schedule
- Change Management issues – solicit ideas
- Summary / Way Ahead



# Schedule





# Agenda

---

- Introduction
- Outputs of Initiative
  - Users Guide
  - Automated Tool – Turbo Technology Program Management Model (TurboTPMM)
- Upcoming OSD-level Policy Changes
- Schedule
- ➡ ■ Change Management issues – solicit ideas
- Summary / Way Ahead



# Change Management Issues

---

***Change in Processes == Stress in Workforce***

- **In Work: “How do we implement?”**
  - **Survey on current environment – what are our barriers to process change?**
  - **Form plan to work current environment most effectively**
- **Any Suggestions?**

**→ Any Discussion at all!**

**Claudia Kropas-Hughes**

**937-904-3558**

**Claudia.kropas-hughes@wpafb.af.mil**



# Agenda

---

- Introduction
- Outputs of Initiative
  - Users Guide
  - Automated Tool – Turbo Technology Program Management Model (TurboTPMM)
- Upcoming OSD-level Policy Changes
- Schedule
- Change Management issues – solicit ideas
- ➡ ■ Summary / Way Ahead



## Summary / Way Ahead

---

- **Modify Stage-Gating tool for AF application**
- **Finalize User Guide and Gates**
- **Finalize Communication/Change Management Plan**
- **Initiate Workforce Development (Training) Plan**

**We *WELCOME***  
**Recommendations, Suggestions, Comments,**  
**Personal Examples**  
**→ Any Discussion at all!**

**Claudia Kropas-Hughes**  
**937-904-3558**  
**[Claudia.kropas-hughes@wpafb.af.mil](mailto:Claudia.kropas-hughes@wpafb.af.mil)**



# Questions?

---



# **TurboTPMM – FY08**

## **Development & Deployment**

---

- **Development environment**
  - **Microsoft® Visual Studio® 2008**
  - **ASP.NET 3.5 application framework**
  - **C# programming language**
  - **Relational Database using MS SQL Server® 2005**
  - **UML 2.0 Object Modeling using Altova® Umodel®**
  - **Microsoft® Team Foundation Server (Configuration Mgmt)**
  
- **Deployment – FY08**
  - **Laptop**
  - **Microsoft ® Windows XP Pro or Server 2003**
  - **Microsoft® IIS Web Server**
  - **SQL Server Express**
  - **IE6 Web browser client**
  - **Microsoft® Office**